be seriously explored as to the most important question of the existence of an undercurrent in these straits?

As seen from this short sketch, there remains plenty of work for geographers and naturalists on our continent, and we may only express the wish that M. Venoukoff's idea of publishing a sketch of the "Unknown Lands," with a summary of the most important questions with regard to them, were executed on a larger scale, and that such a compendium were put into the hands of every young geographer.

NOTES

WE heartily commend to the attention of our readers the announcement of the Rolleston Memorial Committee, to be found in our advertising pages.

THE Scottish Zoological Laboratory, which last year supplied Mr. G. J. Romanes and Prof. Ewart with the material for their researches on Echinodermata, published in the Croonian Lecture, is this year to be placed at Oban. Those who intend to avail themselves of the advantages held out by this institution for the purposes of original work, are requested to communicate with Prof. Ewart, the University, Aberdeen.

THE accommodation for anatomical work at the Prosector's rooms in the Zoological Society's Gardens, which has hitherto been somewhat limited, has lately been increased by the erection of three new working-rooms, intended for the use of students. These rooms are now finished, and are at present tenanted by a small Long-Vacation class from Cambridge, who, under the superintendence of Mr. T. T. Lister, the Demonstrator of Comparative Anatomy in that University, are studying practically the anatomy of the *Mammalia* on the abundant material in that group provided by the Society's Menagerie. The class, it may be remarked, includes two lady students from Newnham College. It is to be hoped that when this class concludes its labours at the end of the month, other students may be found disposed to profit by the new facilities for work afforded them by the Zoological Society, and that thus the expense incurred in the erection of these new rooms may be fully justified by the increased scientific results reaped in the Regent's Park from the superabundant material at the disposal of Mr. Forbes.

THE honour of Knighthood has been conferred upon Mr. F. J. Bramwell, C.E., F.R.S., for his services to technical education.

THE German Emperor has conferred on Dr. Schliemann the Prussian Order of the Crown of the Second Class.

THE death is announced, at the age of seventy-seven, of Mr. Hewett Cottrell Watson, the well known English botanist.

DR. FERDINAND KELLER, the well-known Swiss archæologist, died at Zurich on July 21, in his eighty-first year. Dr. Keller had a decided taste for science in his youth, and shortly after leaving the University went to Paris, where he spent some time in the study of natural history. In 1832 he discovered a number of Celtic grave-mounds on the Burghölzli, a circumstance that led to the formation of the national Swiss Antiquarian Society. Of this Keller was named president, a position that he occupied for many years. The first work of the society was the exploration of the Burghölzli; and other similar researches, which threw much light on the primeval history of Switzerland, were undertaken. In 1837 began the publication of the Society's *Communications*, thirty volumes of which were wholly illustrated, and almost wholly written, by the president. In 1853 he opened the series of researches into the origin of Swiss lake-dwellings which have made his name so widely known, and revealed the way of life, in its minutest details, of a race of men whose mere existence had hardly before been suspected. Between 1860 and 1864 Dr. Keller gave to the world the results of his investigation of the Roman antiquities of eastern Switzerland. He wrote or edited further a history of the Abbey of Zurich, of the arms of Zurich, and sundry miscellaneous papers relating to life and culture in the middle ages. Until past his eighty-first year Dr. Keller continued to be an active and energetic member of the society which he had founded.

THE thirty-fourth summer meeting of the Institution of Mechanical Engineers was opened on Tuesday in Newcastle-on-Tyne, this being the third visit of the Institution to that town. The chair was occupied by the president, Mr. Edward A. Cowper. The president, after some remarks on foreign competition, gave a statement of the result of the progress of mechanical engineering during the past twelve years, and expressed the hope that the latter part of the present century would be marked not only by small improvements, but by many substantial inventions for the good of mankind. Mr. I. Lowthian Bell read an exhaustive paper on the Tyne as connected with the history of engineering, and a paper by Mr. F. C. Marshall of Newcastle, on the progress and development of the marine engine, was also read.

THE *Sydney Mail* brings us the welcome news that the Biological Station has been fairly established at Watson's Bay, under the direction of the well-known Russian naturalist, Dr. Miklucho-Maclay. During the last two years Mr. Maclay has been endeavouring to establish a zoological station in the neighbourhood of Sydney. Being seconded in his efforts by the Royal and Linnean Societies of Victoria and by the Royal Society of New South Wales, he has obtained from the Government an eligible site at Watson's Bay, most appropriate for the purpose. The station is situated on the shallow basin of Port Jackson, and close to the deep water of the Pacific, with large freshwater swamps and lagoons in the immediate neighbourhood, and a vast tract of wild forest country to the north, which probably will remain for a long time to come in its primitive wildness. The communication between Watson's Bay and Sydney by steamer being frequent and rapid (half an hour), the scientific work at the station will be greatly facilitated by the museums, gardens, and libraries of Sydney. The expenses for the building are estimated at 600*l.*, and will be covered by the sum of 300*l.* already allowed by Government and by the subscriptions, whilst the yearly expenses will probably be covered by annual grants of the Linnean and Royal Societies of Victoria and of New South Wales. The building, which stands on a slight eminence overlooking Camp Cove, with lovely views from the balconies on all the four sides, has been constructed to suit the requirements of a biological laboratory. It has five work-rooms, two bed-rooms, a bath-room, and a room for stores, plenty of light being provided for the work-rooms, which are fifteen feet by twelve feet each and twelve feet high. The partitions between each set of rooms are constructed of studding and double-lined, the space being filled with sawdust for the prevention of noise. The trustees are quite satisfied with the building; even upon so humble a scale as the present, it promises to give very good results. It may be hoped that the institution will become a bond of union between all those in Australia who are interested in biological research. As to the expected results we can but repeat M. Maclay's words: "Next after the tropics (which are the richest in animal life) the widest field offered to the investigator of nature, and consequently the most suitable region for the establishment of zoological stations, is Australia, with a fauna so interesting, so important, and so far from being sufficiently known, especially as regards anatomy and embryology."

PROF. C. V. RILEY, chief of the U.S. Entomological Commission, has accepted the position of Entomologist to the

Department of Agriculture, which has been tendered him by the new Commissioner, Dr. Geo. B. Loring. The appointment is to take effect on August 1. It will be remembered that, owing to differences with the retiring Commissioner of Agriculture, Prof. Riley resigned this same position two years ago, and we understand that he accepts it again at a salary less than that which the Members of the Entomological Commission get, because his reinstatement has been so generally demanded by scientific and agricultural associations, and because there is a near prospect, under the new administration, of the department being enlarged in scope and usefulness. Prof. J. H. Comstock, the retiring entomologist, was formerly an assistant under Prof. Riley, and will continue his connection with the department, pursuing the special work on the Coccidæ, which he has more particularly been engaged in. The reappointment of Prof. Riley will meet with approval not only in America, but here, where he has many riends and his work is well known and appreciated.

THE opening of the Exhibition of Electricity at Paris has been postponed as we anticipated. The ceremony will take place on August 11, and numerous speeches will be delivered by the public authorities. The electrical railway is being constructed from the Place de la Concorde to the Porte de l'Est of the Palais de l'Industrie. The posts required for supporting the copper wire required are attracting considerable public notice.

THE steamer *Travailleur* of the French Navy is now engaged in the Mediterranean Sea for dredging purposes, with a regular staff of scientific workers on board.

ONE of the results in Paris of the advent of two comets has been to infuse life into the popular Trocadero Observatory, which is visited by a large number of members, and where a course of lectures on several astronomical subjects is going on.

THE seventh annual conference of the Cryptogamic Society of Scotland will commence at Salen, Island of Mull, on Tuesday, August 30, 1881.

THE arrangements connected with the unveiling of the statue of Harvey at Folkestone on Saturday next, August 6, by Prof. Owen, are now nearly completed. It is expected that there will be a large concourse of doctors and others on the occasion. A small bust of the much-admired head of the statue is now on view in the western gallery of the Sanitary Exhibition at South Kensington, and can be had either in terra-cotta or imitation bronze. A reduction of the whole statue is also contemplated by the sculptor, Mr. A. B. Joy, and will be completed if a sufficient number of subscribers should order it.

IN a *Gazette* covering 250 pages have been published the new Statutes which have been promulgated by the University of Oxford Commissioners.

WE have received *Anthony's Photographic Bulletin* (New York) for June, containing an enlarged copy of Dr. Henry Draper's photograph of the nebula in Orion. The enlargement shows we have very little to hope for in this direction, still the result is a *tour de force* which reflects credit on Dr. Draper. The same number contains an excellent photograph of the Doctor himself.

WE regret to learn that the Committee, formed more than twelve months ago, to raise and present to Dr. William Farr, C.B., F.R.S., a testimonial on his retirement from the public service, have only succeeded in obtaining 930*l.* This sum has been temporarily invested in the names of trustees; and, disappointed as the Committee feel at the comparatively small success of their efforts, they have decided to close the fund so soon as they are able to obtain the small balance now required to raise the amount of the testimonial to 1000*l.* We trust there will at least be no difficulty in obtaining the small sum still required to complete the testimonial.

PHILOLOGISTS will be glad to learn that Prof. G. Beltrame's valuable papers on the Denka language have at last been published in full. They occupy the whole of the current volume of the Italian Geographical Society's *Memoirs*, and consist of three parts, a very complete grammar, an Italian-Denka and a Denka-Italian vocabulary, the former of nearly 4000, the latter of 2000 words. The grammar had already appeared in previous bulletins of the society; but these are now mostly out of print, and in any case the directors rightly considered that students would find it convenient to have all the documents collected in one volume. The Denka is one of the most widespread as well as one of the most interesting of all the Negro tongues current in the White Nile region, being spoken with great uniformity by all the tribes between 5°–12° N. along the main stream and its tributaries, who are collectively known to the Arabs as the Denka nation, but who call themselves *Jen*, a derivative form of *Jan* = race, people. They lie mainly between the Nuêr and Shillûks on the north, and the powerful Bari nation on the south, stretching westwards as far as Dar-Fertit, and south-westwards to the Nyam-Nyam country. There are altogether twenty-five chief tribes, but the common speech presents scarcely any dialectic variety except amongst the Shîr in the extreme south, and amongst the Abuyo and others in the Sobat valley. The language itself is quite distinct from any of the other Upper Nilotic idioms, and is characterised by remarkable regularity and clearness in its structure. It is entirely destitute of grammatical endings, and most of the words are monosyllabic. Prof. Beltrame belongs to a somewhat obsolete school of philologists; hence still speaks of six cases, moods, and other verbal forms. But it is sufficiently evident from his otherwise lucid exposition, and especially from his copious examples, that there are neither cases, moods, tenses, nor, strictly speaking, verbs at all in the language. It need scarcely be remarked that the Denka has nothing in common either with Galla, Ki-Ganda, or other members of the surrounding Hamitic and Bantu linguistic families. It forms one of the numerous independent groups that have been developed during the course of ages amongst the true negro tribes of Sudan and the Upper Nile Valley. Prof. Beltrame's papers must be regarded as a valuable addition to our knowledge of African forms of speech, and will prove of permanent value when the time comes for a more exhaustive study of this ethnical domain.

THE International Pharmaceutical Conference is holding its meetings in London during the present week; one of the questions engaging its attention is an International Pharmacopœia, the desirability of which is generally admitted.

A SLIGHT shock of earthquake was felt at Bangor, Maine, U.S., on July 31.

AT the last meeting of the Natural History Class of the University of Edinburgh, held on Monday, July 25, an illuminated address was presented to Prof. Alleyne Nicholson, of St. Andrews, who has been lecturing on behalf of Sir Wyville Thompson for the past three sessions. The address was signed by about 500 of the students who have attended Prof. Nicholson's lectures during the past three years.

SHORTLY before midnight on July 20 a splendid meteor was observed at Munich. It resembled a fiery ball of 30 centimetres diameter, and it passed slowly from south to north in an almost horizontal direction.

AT the distance of twenty-seven miles north-east from Padang (on the western coast of Sumatra) and some fifteen miles east from Lake Singkarah, we find a high land very similar to the Saxon highlands, and reaching a height of 2400 feet above the sea-level, the hills of which are formed of sandstones which contain immense coal-fields. According to a description of them, just published by D. D. Veth in the *Deutsche Geographische Blätter*, these coal-fields may contain altogether no less than 300 millions of tons of good coal. The northern, or Parambahan part of them contains two main beds of coal, having an average thickness of thirty-three feet and occupying a surface of about three square kilometres, that is, about 20 millions of tons of good coal; but the rocks are rather disturbed, and therefore the extraction of coal would be difficult. The middle, or Singalut part, situated on the right bank of the Ombilin River, contains about 80 millions of tons of coal, and consists of seven thin beds of coal, which have altogether an average thickness of 16 feet, But the best coal-field is the southern, or Sungei-Durian part. situated on the left bank of the Ombilin River, which contains about 200 millions of tons of good coal. The beds of coal are three, having a thickness of 20, 7, and 7 feet, separated from one another by sheets of sandstone 50 to 70 feet thick. As to the quality of the coal, thirteen tons having been extracted and brought to Padang, it was found that as fuel for steam-engines this coal is not below that of Cardiff or Newcastle, but that it would not be as good as these two in the production of lighting gas or for iron furnaces. As to the transport of this coal to the sea-coast, it would necessitate the construction of a railway 65 or even 100 miles long.

THE Danzig *Naturforschende Gesellschaft*, which numbers now no less than 398 members, has just issued a new volume of its *Proceedings* (new series, vol. v., fascicules 1 and 2). It contains, besides the minutes of meetings of the Anthropological, Physical, Chemical, and Medical Sections, much valuable information, especially as to the botany and zoology of Prussia. The *pièce de resistance* of this volume is an essay at a topographical flora of West Prussia, by H. von Klinggraeff, being a *résumé* of the author's own researches and of what is known on the flora of this province. The author finds that there are in this province no less than 1218 species of Phanerogams, 44 species of cellular Cryptogams, 363 species of mosses, 18 of Characeæ, and 276 species of lichens, and he takes into account only the true inhabitants of the province. As to the lower Cryptogams, the figures are but provisional ones, as the algæ and mushrooms of the province are but incompletely known. We notice also in this volume papers on the freshwater molluscs of the neighbourhoods of Danzig, by E. Schumann; on the Ichneumonids of Western and Eastern Prussia, by C. Brischke; the *Reports* on the third meeting of the Botanical and Zoological Society of Western Prussia, containing a series of catalogues of plants found during botanical excursions; an interesting paper by C. Brischke, which deals with a rather neglected question, namely, with the Phytophags which the author has observed and cultivated in the neighbourhood of Danzig; a paper on the bronze-basin of Steinwage, by Dr. Fröling; and on the Cenoman fossils which are found in the diluvium near Danzig, by Dr. Kiezow.

THE St. Petersburg Naturalist's Society intend to offer various prizes for botanical papers, and to couple with them the name of the late Dr. Schleiden, who was a member of the St. Petersburg Academy and Russian State counsellor.

ON July 21 the meeting of Polish Naturalists and Physicians took place at Cracow. Some 500 members attended the meeting.

ACCORDING to the latest investigations the *Phylloxera vastatrix* has spread enormously upon the peninsula of Istria, particularly in the neighbourhood of Pirano. The plague threatens to infect the vineyards of the Karst, of Friaul, and of Carniola.

WE learn from a circular, issued by the Director of the St. Petersburg Central Physical Observatory, that all the Arctic meteorological stations will soon be opened, and that about the autumn of 1882 we will have observations from these stations for a whole year. The following, we may remind our readers, are the stations to be established:—At Upernivik, by Denmark; in Northern Finnmarken, by Norway; on the Jan Mayen Island, and, if possible, on the western coast of Grönland, by Austria-Hungary; on Spitzbergen, by Sweden; on Novaya-Zemlya (already opened a year ago) and at the mouth of Lena River, by Russia; on Point Barrow and in Lady Franklin's Bay, by the United States. Sites have already been taken by the United States and Norway to open new stations. It is to be hoped that meteorological stations will be opened, according to the wish of the International Conference at Bern, also in Antarctic regions, namely, on South Georgia, by Germany, and at Cape Horn, by France; whilst the Netherlands expect to establish a station further in the Arctic region, namely, at Dickson Haven in Siberia. The International Conference which will be opened at St. Petersburg will establish the method of observation to be adopted at all these stations.

AN International Exhibition is planned for 1883 at Shanghai.

THE additions to the Zoological Society's Gardens during the past week include two Common Marmosets (*Hapale jacchus*) from South-East Brazil, presented by the Lord W. G. Cecil; two Common Squirrels (*Sciurus vulgaris*), British, presented by Mr. C. B. Barber; a Laughing Kingfisher (*Dacelo gigantea*) from Australia, presented by Mr. Douglas; two Common Jays (*Garrulus glandarius*), British, presented by Mr. Arthur F. Astlay; a Common Cuckoo (*Cuculus canorus*), British, presented by Mr. Harry Morrisson; a Surucucu Snake (*Lachesis mutus*) from Pernambuco, presented by Mr. C. A. Craven; two Common Boas (*Boa constrictor*) from South America, presented by Mr. G. H. Hawtayne; a Common Adder (*Vipera berus*), British, presented by Mr. J. Snow; two Blossom-headed Parrakeets (*Palæornis cyanocephalus*) from India, four Common Widgeons (*Mareca penelope*), an Osprey (*Pandion haliætus*), European, purchased; a Guinea Baboon (*Cynocephalus sphinx*) from West Africa, received in exchange. Amongst the additions to the Insectarium during the same time are imagos of *Antheræa yama-mai*, bred from eggs, and larvæ of the Lobster Moth (*Stauropus fagi*), Pebble and Swallow Prominent Moths (*Notodonta ziczac* and *dictæa*) and Purple Thorn Moth (*Selenia illustraria*). Numerous Ant-Lions (*Myrmeleo formicarius*) are also now emerging in the perfect state from their burrows in the sand.

SOLAR PHYSICS—THE CHEMISTRY OF THE SUN[1]

WHAT then are those precise difficulties to which reference has been made?

The number of them is considerable, and they have arisen from careful study extending over many different fields of work.

1. We most conveniently begin by noticing those suggested in the work of comparing the lines of the different elementary bodies with the Fraunhoferian lines; work done chiefly by Kirchhoff, Angström, Thalèn and others. Kirchhoff was not long before he found that to say that each substance had a spectrum entirely and specially belonging to that particular substance was not true. He says,[2] "If we compare the spectra of the different metals with each other, several of the bright lines appear to coincide." Now Kirchhoff was working with Bunsen as his collaborateur, and therefore this was not said lightly, as we may imagine. Similarly Ångström, who was working with the assistance of the Professor of Chemistry at Upsala, was driven to exactly the same conclusion. He says[3]—

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[1] Lectures in the Course on Solar Physics at South Kensington (see p. 150). Revised from shorthand notes. Continued from p. 301.

[2] "Researches on the Solar Spectrum." Roscoe's translation. Part I. p. 10.

[3] "Recherches sur le Spectre Solaire," p. 36.